

WHAT IS CLAIMED IS:

1. A method comprising:

5 acquiring first data representing a three-dimensional surface of at least a portion of a patient's body while the patient is in a first position; and acquiring second data representing at least one internal portion of the patient's body while the patient is in the first position.

2. A method according to Claim 1, further comprising:

10 determining a radiation treatment plan based on the first data, the second data, and on data representing a physical layout of a radiation treatment station.

3. A method according to Claim 2, wherein the step of determining the radiation treatment plan comprises:

15 determining a position of a radiation treatment device that will avoid the patient's body and that will allow irradiation of a portion of the at least one internal portion.

20 4. A method according to Claim 1, wherein the first position is a position that is substantially maintained during a computed tomography scan, the method further comprising:

25 acquiring third data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a second position substantially maintained in preparation for radiation treatment.

5. A method according to Claim 4, further comprising:

30 determining, based on the first data and the third data, that the second position does not correspond to the first position.

6. A method according to Claim 5, further comprising:

instructing the patient to move so that the second position corresponds to the first position.

7. A method according to Claim 5, further comprising:

5 changing a radiation treatment plan for the patient based on a difference between the first position and the second position.

8. A method according to Claim 1, further comprising:

10 determining, based on the first data and the third data, that the patient represented by the first data is different from the patient represented by the third data.

9. A method according to Claim 4, further comprising:

15 determining, based on the first data and the third data, that the patient's body has changed by greater than a threshold amount; and in response to the determination that the patient's body has changed by greater than the threshold amount, acquiring fourth data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a third position substantially
20 maintained during a second computed tomography scan.

10. A method according to Claim 1, further comprising:

25 acquiring third data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a second position; and

activating a radiation beam according to a radiation treatment plan if it is determined based on the third data that the second position corresponds to a point in a cycle of body motion specified by the treatment plan.

30 11. A method according to Claim 10, further comprising:

acquiring fourth data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a third position; and

5 deactivating the radiation beam according to a radiation treatment plan if it is determined based on the fourth data that the third position does not correspond to the point specified by the treatment plan.

12. A method comprising:

10 acquiring computed tomography data of a patient while the patient remains substantially in a first position;

acquiring first three-dimensional data representing a surface of the patient while the patient remains substantially in the first position;

15 determining a radiation treatment plan based on the computed tomography data, the three-dimensional data, and data representing a physical layout of a radiation treatment station;

acquiring second three-dimensional data representing a surface of the patient while the patient remains substantially in a second position at the radiation treatment station;

20 determining if the second three-dimensional data corresponds to the first three-dimensional data; and

delivering radiation to the patient according to the radiation treatment plan if it is determined that the second three-dimensional data corresponds to the first three-dimensional data.

25 13. A system comprising:

a computed tomography scanning device for acquiring computed tomography data of a patient while the patient is in a scanning position; and

30 a first surface photogrammetry device for acquiring first three-dimensional surface data of at least a portion of the patient's body while the patient is in the scanning position.

14. A system according to Claim 13, further comprising:

a treatment planning device for generating a radiation treatment plan based on the computed tomography data, the first three-dimensional surface data, and data representing a physical layout of a radiation treatment station.

15. A system according to Claim 13, further comprising:

a radiation treatment device for delivering radiation to the patient;
a second surface photogrammetry device for acquiring second three-dimensional surface data of at least a portion of the patient's body while the patient is in a treatment position on the radiation treatment device;

a controller for determining if the treatment position corresponds to the scanning position based on the first three-dimensional surface data and the second three-dimensional surface data.

16. A system according to Claim 15, wherein the first surface photogrammetry device and the second surface photogrammetry device are a same device.

17. A medium storing controller-executable process steps, the process steps comprising:

a step to acquire first data representing a three-dimensional surface of at least a portion of a patient's body while the patient is in a first position; and

a step to acquire second data representing at least one internal portion of the patient's body while the patient is in the first position.

18. A medium according to Claim 17, the process steps further comprising:

a step to determine a radiation treatment plan based on the first data, the second data, and data representing a physical layout of a radiation treatment station.

- 5 19. A medium according to Claim 17, wherein the first position is a position that is substantially maintained during a computed tomography scan, the process steps further comprising:

10 a step to acquire third data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a second position substantially maintained in preparation for radiation treatment.

20. A medium according to Claim 19, the process steps further comprising:

15 a step to determine, based on the first data and the third data, that the patient's body has changed by greater than a threshold amount; and

20 a step to acquire, in response to the determination that the patient's body has changed by greater than the threshold amount, fourth data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a third position substantially maintained during a second computed tomography scan.

21. A medium according to Claim 17, the process steps further comprising:

25 a step to acquire third data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a second position; and

a step to activate a radiation beam according to a radiation treatment plan if it is determined, based on the third data, that the second position corresponds to a position specified by the treatment plan.

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22. A medium according to Claim 17, the process steps further comprising:

a step to acquire third data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a second position; and

a step to activate a radiation beam according to a radiation treatment plan if it is determined based on the third data that the second position corresponds to a point in a cycle of body motion specified by the treatment plan.

23. A medium according to Claim 22, the process steps further comprising:

a step to acquire fourth data representing a three-dimensional surface of at least a portion of the patient's body while the patient is in a third position; and

a step to deactivate the radiation beam according to a radiation treatment plan if it is determined based on the fourth data that the third position does not correspond to the point specified by the treatment plan.